

Middle Clinch and Tributaries

Total Maximum Load (TMDL) Kick-Off



Lebanon Town Hall
Lebanon, VA
May 26, 2011



Total Maximum Daily Load (TMDL) for the Middle
Clinch and Tributaries

Natural Resource Solutions
Through Science and Engineering

Why are we here?

■ High Fecal Bacteria in the Middle Clinch Tributaries

○ What's Fecal Bacteria?

- Bacteria associated with feces from warm blooded animals (fecal coliform, *E. coli*)

○ Why should we care?

- Swimming/Recreation Use
- Pathogens (including some strains of *E. coli*)
- Parasites

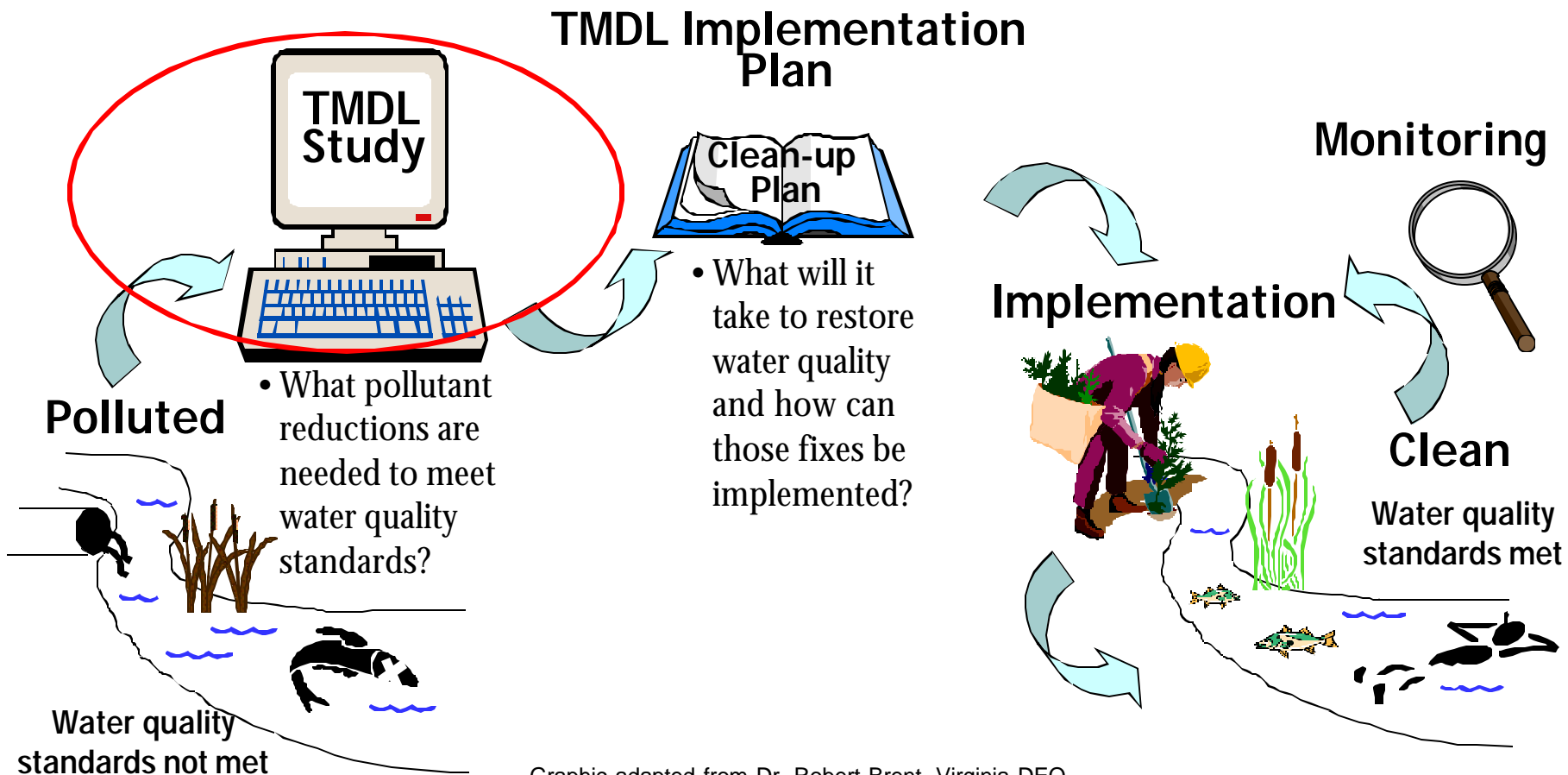


○ Water Quality Standards for Primary Contact Recreation

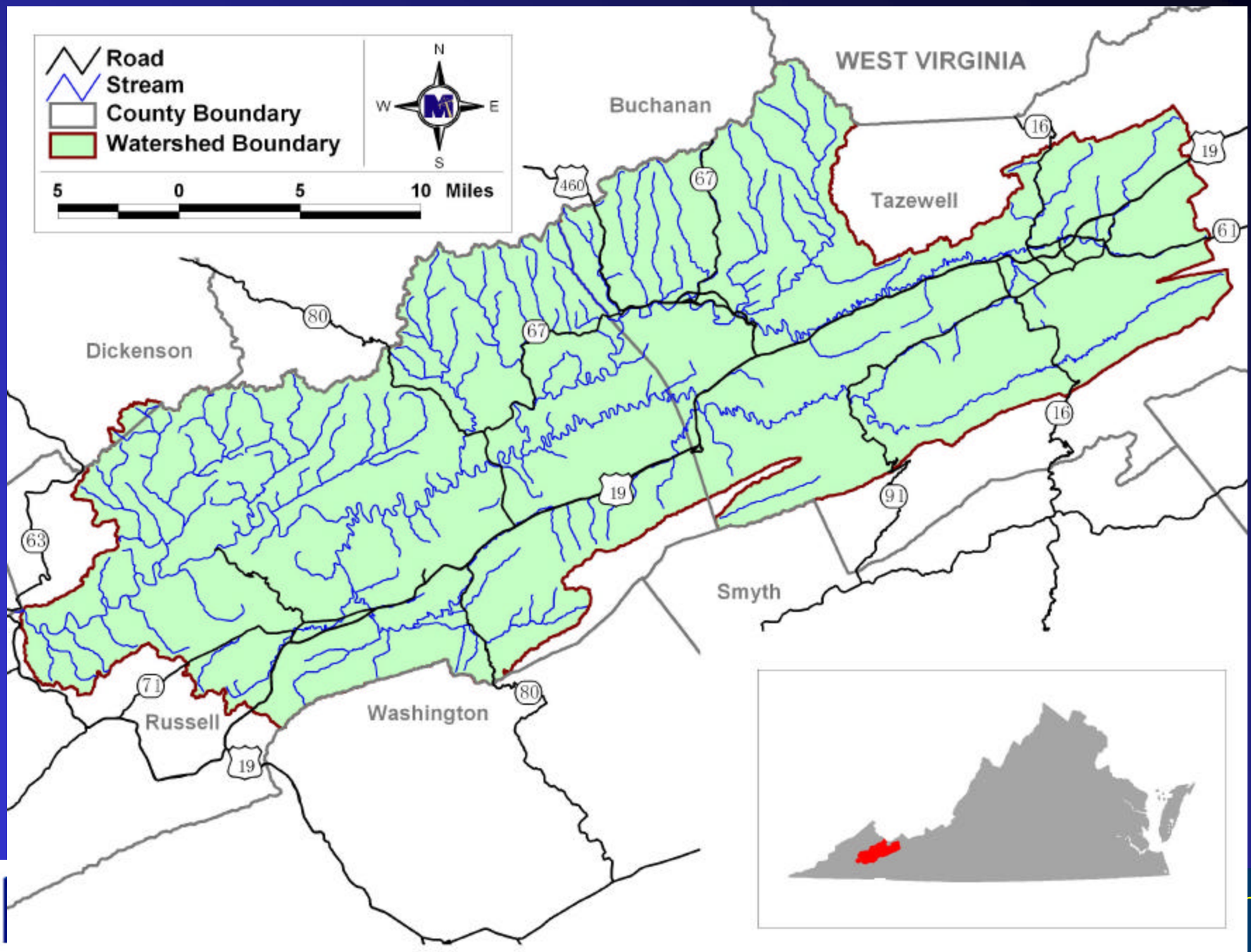
- Swimming/Recreation Use
- Instantaneous: 235 cfu/100 ml *E. coli*
- Monthly Geometric Mean: 126 cfu/100 ml *E. coli*



Overview of TMDL Process

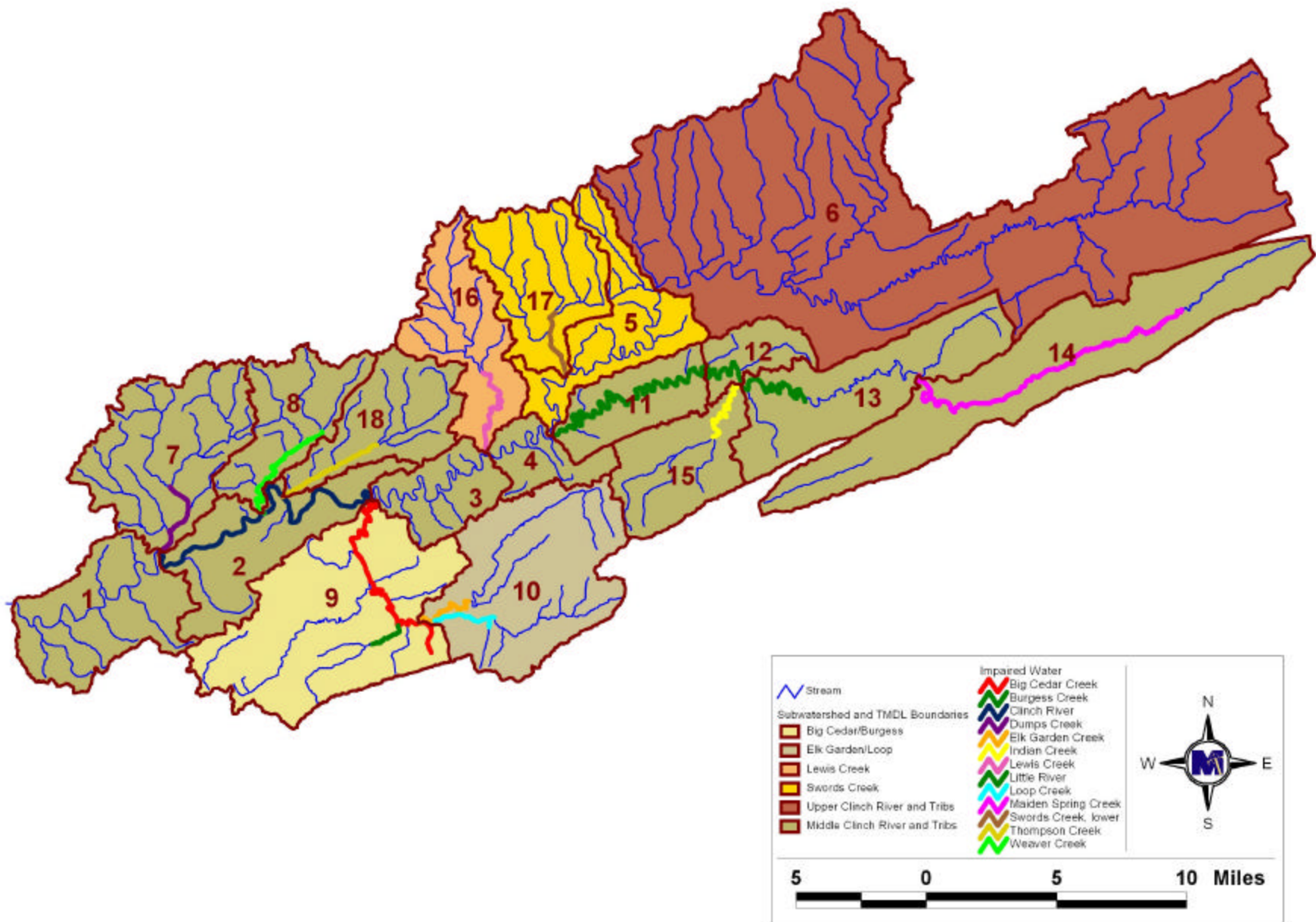


Graphic adapted from Dr. Robert Brent, Virginia DEQ



Impaired Streams

Stream Name	Impairment ID	Year Listed	2010 River Miles	2010 Listing Violation%	Impairment Length Description
Indian Creek	VAS-P05R_IDN01A04	2004	3.98	16%	Rt 19 crossing to the Little River conf at Wardell
Clinch River	VAS-P07R_CLN01A00	2002	13.95	18%	Conf with Big Cedar Creek near Pinnacles to conf with Dumps Creek at Carbo
Big Cedar Creek	VAS-P06R_BCD01A98	2006	4.11	33%	From Daughertys Cave to conf with Clinch River
Big Cedar Creek	VAS-P06R_BCD02A02	2008	1.12	33%	Conf with Little Cedar Creek to the vicinity of Daughertys Cave
Big Cedar Creek	VAS-P06R_BCD02A00	2006	2.75	25%	Lebanon raw water intake to the conf with Little Cedar Creek
Big Cedar Creek	VAS-P06R_BCD03A00	2006	3.23	67%	Headwaters to Lebanon raw water intake
Loop Creek	VAS-P06R_LOO01A06	2006	2.87	50%	Route 80 to the Elk Garden Creek conf
Burgess Creek	VAS-P06R_BUG01A06	2006	1.5	67%	Conf with Campbell Branch to confwith Big Cedar Creek
Elk Garden Creek	VAS-P06R_EKG01A06	2006	3.28	75%	From Elk Garden to conf with Big Cedar Creek
Weaver Creek	VAS-P07R_WEA01A06	2006	9.14	50%	From conf with Hart Creek to conf with the Clinch River near Artrip
Thompson Creek	VAS-P07R_TMP01A06	2006	4.26	50%	Coulwood to conf with the Clinch River
Lewis Creek	VAS-P04R_LWS01A98	2006	4.83	33%	Conf with Stone Branch at Flat Rock to the Clinch River
Lewis Creek	VAS-P04R_LWS01A10	2010	3.43	33%	Conf with Grassy Creek to Stone Branch conf at Flat Rock
Hess Creek	VAS-P04R_HES01A10	2010	1.04	41%	Groundhog Hollow to just south of Dye
Swords Creek	VAS-P04R_HES01A10	2010	2.88	25%	Sulfur Spring Branch at Dye conf to the Clinch River
Little River	VAS-P05R_LTR02A00	2004	5.18	50%	Claypool Hill STP to Laurel Creek conf near Wardell
Little River	VAS-P05R_LTR02A02	2008	4.11	50%	Laurel Creek conf near Wardell to Grays Branch conf at Russell/Tazewell County line
Maiden Spring Creek	VAS-P05R_MSC01A02	2004	6.51	25%	Little River conf upstream to foot of Morris Knob north of Robbins Gap
Maiden Spring Creek	VAS-P05R_MSC01C04	2004	8.57	42%	Unnamed tributary with Buchanan Cemetery through Thompson Valley to Morris Knob



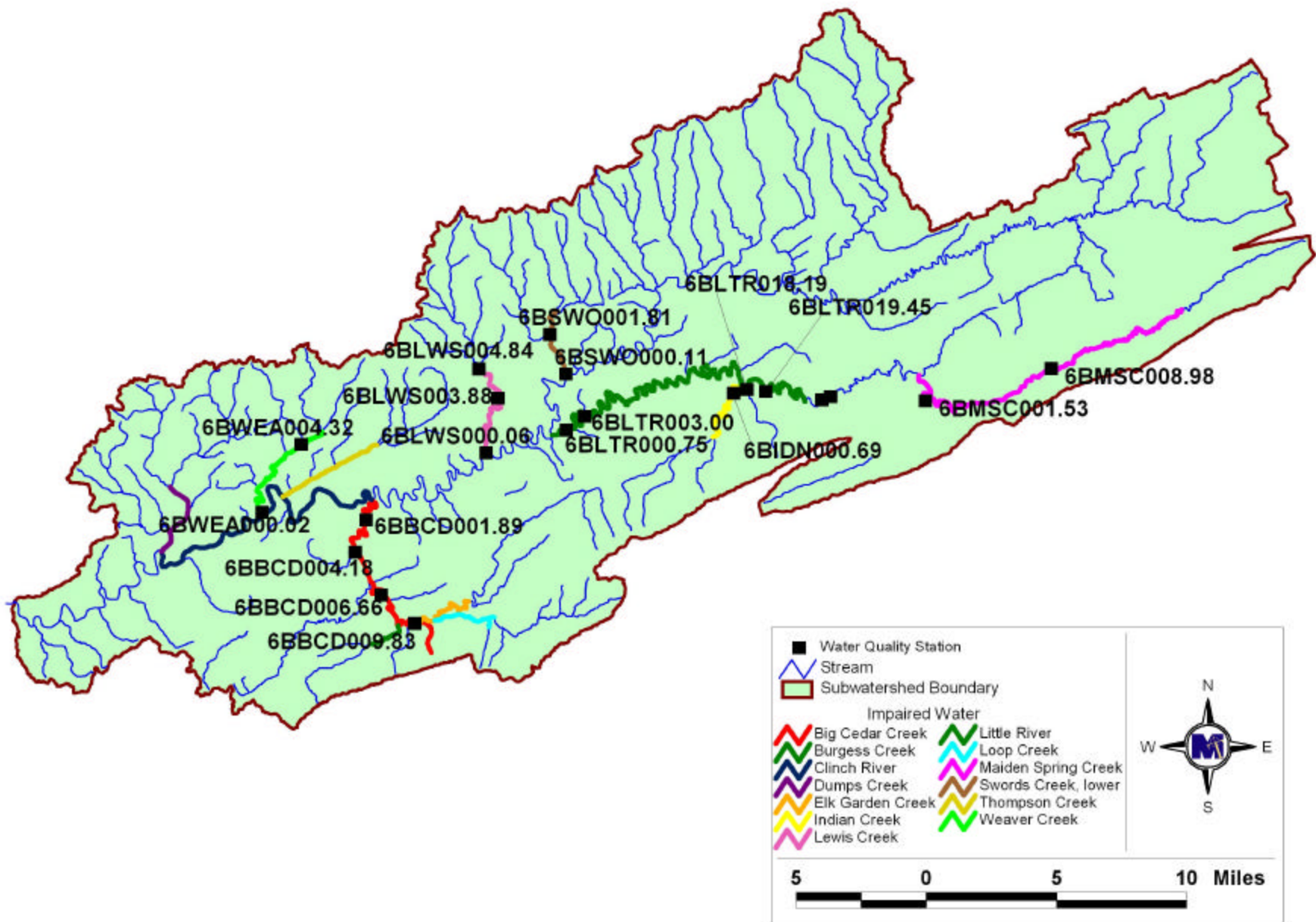
E. Coli Bacteria Data

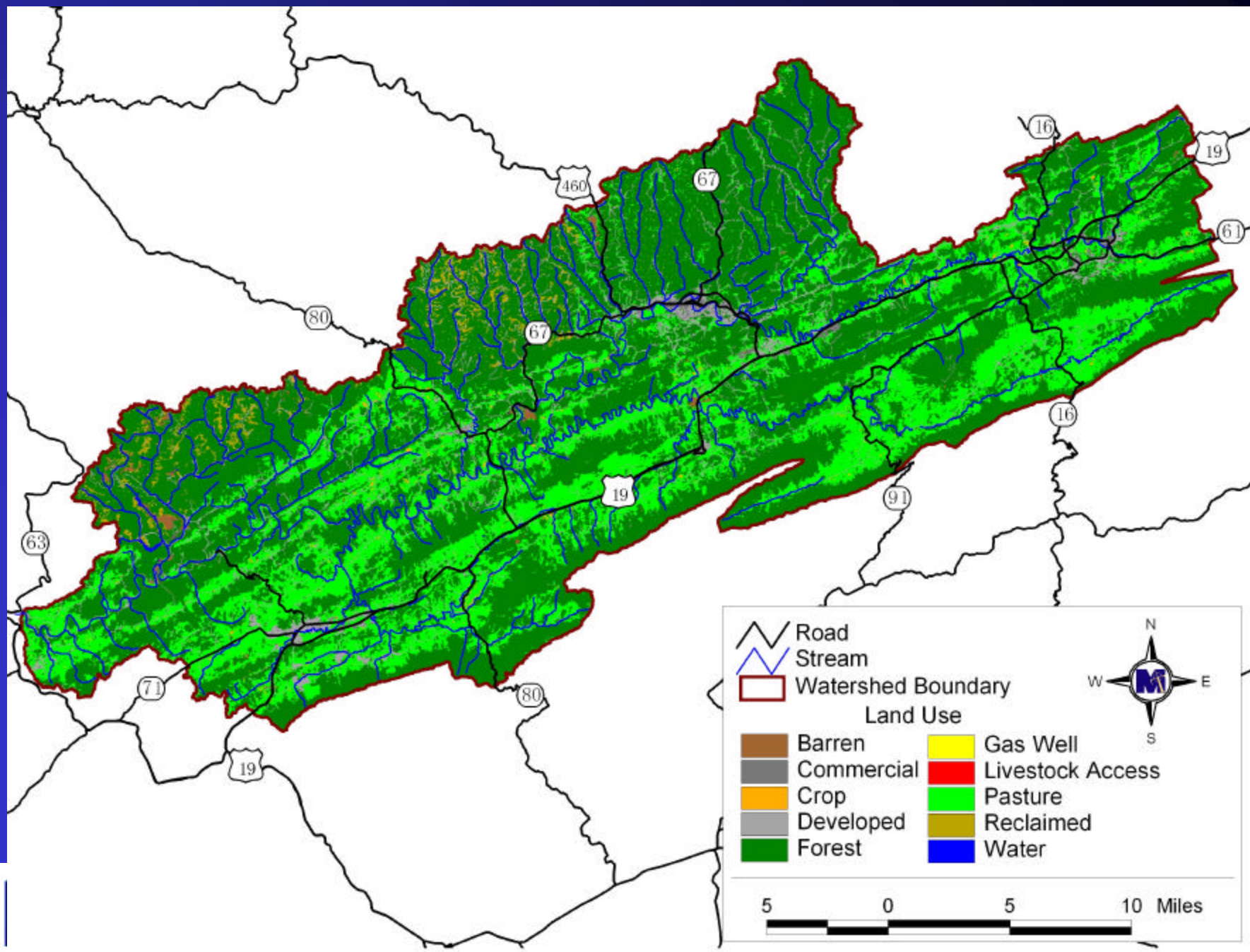
Stream	Station	Date	Count	Min	Max	Mean	Median	Std Dev	Violation %
Big Cedar Creek	6BBCD001.89	7/2003 - 12/2010	24	25	2,000	369	88	595	33.3%
Big Cedar Creek	6BBCD006.66	7/2003 - 12/2010	24	25	2,000	352	200	530	33.3%
Big Cedar Creek	6BBCD009.83	7/2003 - 12/2010	24	25	2,000	534	380	526	70.8%
Dumps Creek	6BDUM000.04	1/2005 - 12/2010	16	25	320	76	50	85	12.5%
Elk Garden Creek	6BEKG004.18	1/2005 - 12/2010	15	50	2,000	784	600	672	86.7%
Elk Garden Creek	6BEKG008.48	1/2009 - 12/2010	12	100	2,000	600	300	675	75.0%
Indian Creek	6BIDN000.69	1/2007 - 1/2011	22	25	1,100	225	25	352	22.7%
Little River	6BLTR000.75	1/2007 - 11/2008	11	25	750	114	25	216	9.1%
Little River	6BLTR018.19	1/2007 - 1/2011	22	25	2,000	390	265	557	54.5%
Little River	6BLTR019.45	3/2008 - 5/2009	2	20	20	20	NA	0	0.0%
Little River	6BLTR025.03	4/2005	1	90	90	90	NA	NA	0.0%
Little River	6BLTR025.45	1/2007 - 11/2008	12	25	400	97	63	105	8.3%
Lewis Creek	6BLWS000.06	2/2007 - 1/2011	22	25	2,000	364	63	533	40.9%
Lewis Creek	6BLWS004.84	2/2007 - 1/2011	21	25	1,600	263	75	392	33.3%
Loop Creek	6BLOO004.25	1/2005 - 12/2010	15	25	1,300	339	220	396	46.7%
Loop Creek	6BLOO006.03	1/2009 - 12/2010	12	25	2,000	441	265	546	50.0%
Maiden Spring Ck	6BMSC001.53	1/2007 - 4/2010	5	25	950	225	50	406	20.0%
Maiden Spring Ck	6BMSC008.98	1/2007 - 1/2011	21	25	2,000	345	120	571	38.1%
Swords Creek	6BSWO000.11	4/2009 - 1/2011	21	25	1,800	386	150	501	38.1%
Swords Creek	6BSWO001.81	2/2007 - 12/2008	12	25	1,400	289	98	448	25.0%
Weaver Creek	6BWEA000.02	8/2003 - 12/2010	24	25	2,000	643	350	677	58.3%
Weaver Creek	6BWEA004.32	8/2003 - 12/2010	24	25	2,000	636	235	731	50.0%



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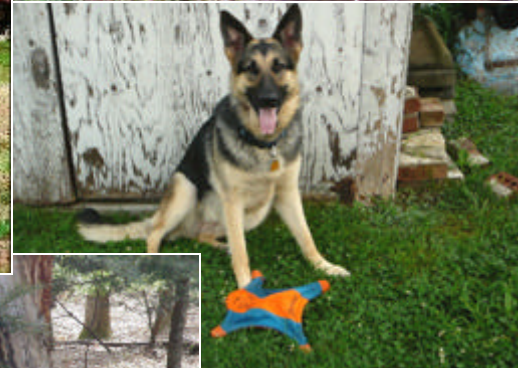
Major components of a TMDL

- Monitoring/Listing - Identify Water Quality Problem
 - Monitoring Ongoing
 - Listing Completed by DEQ
- Source Assessment – Locate Potential Sources of Pollutants in Watershed
 - ○ Estimates Presented here – Please validate
- Modeling – Examine the Movement of Pollutants from Land to Water and Direct Inputs to Water
- Allocation/TMDL – Use a Computer Model to Determine the Load Reductions Necessary to Achieve Water Quality Goals



Source Assessment

- Permitted discharges
 - Wastewater treatment facilities
 - Residential Waste Treatment Systems
- Human
 - Biosolids Applications
 - Failing Septic Systems
 - Straight Pipes
- Pets
- Livestock
- Wildlife



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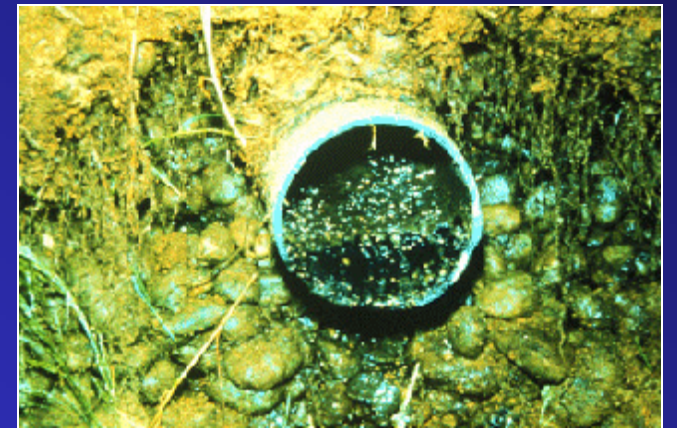
Permits

- Permitted direct discharges of water and bacteria
- 45 Domestic waste treatment permits
- 4 Municipal Wastewater Treatment permits
 - Appalachian Detention Center
 - Lebanon WWTP
 - Honaker STP
 - Claypool Hill STP



Human Population

- Population, housing units, and onsite treatment system based on U.S. Census
- Septic Systems
 - Failure to soil surface throughout year
 - Lateral movement continuously to stream
- Straight Pipes
 - Direct continuous input into stream
- Biosolids
 - Land-applied



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Human Population

NTU - Impairment Grouping	Human Population	Housing Units	Homes with Sewer	Homes with Septic	Estimated Homes with Straight Pipes	Estimated Homes with Failing Septics
Big Cedar/Burgess	7,276	3,420	1,739	1,640	41	276
Elk Garden/Loop	2,025	912	9	890	14	87
Lewis Creek	2,577	1,364	502	810	52	161
Mid Clinch R	13,616	5,854	881	4,670	303	830
Swords Creek	4,157	2,201	580	1,462	159	311
Upper Clinch River	-----TMDL and IP completed!-----					
Total	29,650	13,752	3,712	9,472	568	1,665



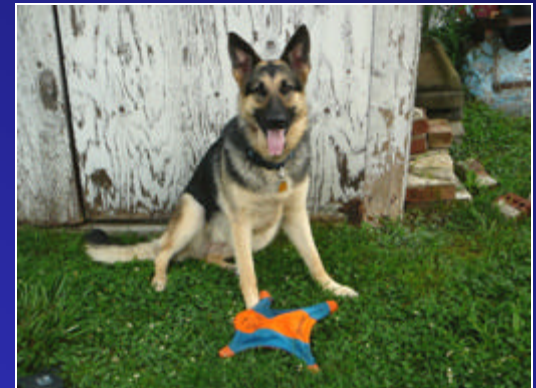
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Pet Population

- Population based on housing units * Pet Density from Vet Assoc. of America
- Pets can contribute bacteria via
 - Runoff from residential and urban lands
 - Fecal matter washed into streams or wetlands

NTU - Impairment Grouping	Dogs	Cats
Big Cedar/Burgess	1,826	2,045
Elk Garden/Loop	487	546
Lewis Creek	729	816
Mid Clinch R	3,126	3,501
Swords Creek	1,175	1,316
Upper Clinch River	TMDL and IP completed!	
Total	7,343	8,224



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Livestock Population

- Population based on amount of pasture in watershed and populations from Virginia Ag Statistics
- Livestock can contribute bacteria via
 - Directly to the stream
 - Runoff from pastures and cropland
 - Runoff from loafing lot areas
 - Runoff from manure spread on pastures and cropland



Livestock Population

NTU - Impairment Grouping	Beef Stocker	Beef Calf	Dairy Milkers	Dairy Dry	Dairy Calf	Horse	Sheep	Hog	Goat
Big Cedar/Burgess	2,840	3,219	47	24	24	0	126	0	0
Elk Garden/Loop	1,802	2,042	30	15	15	0	80	0	0
Lewis Creek	10,004	11,337	167	83	83	0	445	0	0
Mid Clinch R	17,795	22,276	707	353	353	0	1,321	0	0
Swords Creek	14,723	16,686	245	123	123	0	654	0	0
Upper Clinch River	-----TMDL and IP completed!-----								
Total	47,164	55,560	1,196	598	598	0	2,626	0	0



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Wildlife Population

- Population based on habitat area * population densities from VDGIF
- VA & USEPA are not proposing elimination of wildlife.
- Reduction of wildlife or changing a natural background condition is not the intended goal of a TMDL.
- Managing overpopulations is an option for local stakeholders.
- VDGIF could be asked to assist with plan



Wildlife Population

NTU - Impairment Grouping	Deer	Turkey	Beaver	Raccoon	Muskrat	Duck	Goose
Big Cedar/Burgess	1,115	263	566	2287	3331	69	34
Elk Garden/Loop	865	220	504	1771	2460	51	25
Lewis Creek	481	114	235	984	1139	24	12
Mid Clinch R	5,773	1,440	2270	11896	11883	248	122
Swords Creek	979	233	494	2020	2422	50	25
Upper Clinch River	-----TMDL and IP completed!-----						
Total	9,213	2,270	4,069	18,958	21,235	442	218



Determining the TMDLs



Bacteria
Sources

+

Watershed data



TMDL

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Modeling



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maproom

How can you participate?

- Attend meetings
 - Public
 - Send comments
- In the mean time:
 - Dispose of Pet Waste Properly
 - Maintain your Septic System
 - Join a Local Watershed Group – Volunteer!
 - Plant Native Trees and Shrubs in the Riparian Corridor
 - Perform Citizen monitoring



What's Next?

- 30 day comment period ends 6/27/2011:
 - Send comments to Martha Chapman, DEQ
- Final Public Meeting
 - 30 day comment period
- TMDL submitted to EPA then SWCB
- On list for Implementation Plan development



Send Comments To:

Martha Chapman

TMDL Projects Coordinator

Department of Environmental Quality

Martha.chapman@deq.virginia.gov

Phone: 276.676.4845

Fax: 276.676.4899



Extra Information



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Fecal Bacteria Production Comparison

